No. 200400178

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Tennessee Advanced Genetics, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR ORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE PURPOSE , OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT P BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) S OLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBE ERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'5002T'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fourth day of February, in the year two thousand and five.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions* — Form Approved - OMB No. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER
Tennessee Advanced Genetics, Inc. (EST: 6/10/2004 per applicant's authorization)

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
TN96-68

3. VARIETY NAME
5002T

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
2640-C Nolensville Road
Nashville, TN 37211

5. TELEPHONE *(include area code)*
(615) 242-0467

6. FAX *(include area code)*
(615) 248-3461

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PVPO NUMBER 200400178
FILING DATE 4/15/2004

7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
Corporation

8. IF INCORPORATED, GIVE STATE OF INCORPORATION
TN

9. DATE OF INCORPORATION
March 1, 1996

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. *(First person listed will receive all papers)*
David McKinney
Tennessee Advanced Genetics, Inc.
2640-C Nolensville Road
Nashville, TN 37211

FEES RECEIVED
FILING AND EXAMINATION FEES: $ 3,652.00 DATE 4/15/2004
CERTIFICATION FEE: $ 432.00 DATE 8/31/04

11. TELEPHONE *(Include area code)*
(615) 242-0467

12. FAX *(Include area code)*
(615) 248-3461

13. E-MAIL
dmckinney@superiorseeds.org

14. CROP KIND *(Common Name)*
Soybean

16. FAMILY NAME *(Botanical)*
Fabaceae

15. GENUS AND SPECIES NAME OF CROP
Glycine max L. Merr

17. IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ☑ NO

18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (*OPTIONAL*)
☐ YES ☑ NO
IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERICALIZATION. _____

19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)
- a. ☑ Exhibit A. Origin and Breeding History of the Variety
- b. ☑ Exhibit B. Statement of Distinctness
- c. ☑ Exhibit C. Objective Description of Variety
- d. ☑ Exhibit D. Additional Description of the Variety *(Optional)*
- e. ☑ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☑ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository)*
- g. ☑ Filing and Examination Fee ($3,652), made payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)*

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☑ YES *(If "yes", answer items 21 and 22 below)* ☐ NO *(If "no", go to item 23)*

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?
☑ YES ☐ NO
IF YES, WHICH CLASSES? ☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED

22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☑ YES ☐ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.
1 ☒ FOUNDATION ☐ REGISTERED 1 ☒ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?
☑ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ☑ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
David N. McKinney		David N. McKinney	
NAME *(Please print or type)*		NAME *(Please print or type)*	
David N. McKinney		David N. McKinney	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Treasurer	4-12-04	Treasurer	4-12-04

(See reverse for instructions and information collection burden statement)

ST-470 (04-03) designed by the Plant Variety Protection Office using Word 2002.

200400178

INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable *(in the sense that it will reproduce an entire plant)* tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for $3,652 ($432 filing fee and $3,220 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291
Homepage: http://www.ams.usda.gov/science/pvpo/pvp.htm

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that name has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, 10301 Baltimore Avenue, Suite 401 NAL Building, Beltsville, MD 20705. Telephone: (301) 504-5682 http://www.ams.usda.gov/lsg/seed.htm.

ITEM

19a. Give:
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified

19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:

(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, *etc.*

19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

20. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of certified seed)*, the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. *(See Regulations and Rules of Practice, Section 97.103).*

23. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

24. *See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.*

22. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

23. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

Sold to Farmers March 1, 2004

24. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)*

EXHIBIT A: ORIGIN AND BREEDING HISTORY (AMENDED JUNE 2004)

5002T is an F_6-derived line from the cross 'Holladay' (Burton, et al., 1996) x 'Manokin' (Kenworthy, et al., 1996). The F_1 plants were grown in Knoxville, TN in 1991. Harvested F_2 seeds were sent to Costa Rica and grown for generation advancement, without selection, via single-pod descent (using all seeds from pods, rather than single seeds) to the F_5 stage. F_6 plants were grown in Knoxville, TN in 1993, and single plants were harvested. The $F_{6:7}$ plant-rows were grown in Knoxville, TN in 1994, and those rows which were visually desirable were individually bulk harvested. In 1996, seed from one of those bulks was designated as the experimental line TN96-68. TN96-68 was selected based on superior yield and other agronomic traits and was tested in yield trials at multiple locations each year in Tennessee from 1996 to the present. TN96-68 was designated as the cultivar 5002T upon its release in 2002.

Averaged over 46 Tennessee environments from 1996 to 2002, 5002T (3391 kg ha^{-1}) significantly exceeded Manokin (3089 kg ha^{-1}) in seed yield. 5002T was entered in the Tennessee State Variety Test in 2001 and 2002 where its two year average seed yield (3225 kg ha^{-1}) was significantly higher than that of Manokin (2889 kg ha^{-1}) (Allen et al., 2003).

The variety 5002T has been reproduced and observed to be uniform and stable, with no variants or off-types, for the past four generations for characteristics listed in this application.

References

Allen, F.L., R. Johnson, R.C. Williams, M.A. Newman, and G.L. Lentz. 2003. Performance of Soybean Varieties in Tennesse 2002. Univ. of Tennessee Agric. Exp. Stn. Res. Rep. 03-03. http://www.taes.utk.edu/researchprograms/Variety_trials/index.htm (verified 2 April, 2004).

Burton, J.W., T.E. Carter, Jr., and E.B. Huie. 1996. Registration of 'Holladay' soybean. Crop Sci. 36:467.

Kenworthy, W.J., J.G. Kantzes, L.R. Krusberg, and S. Sardanelli. 1996. Registration of 'Manokin' soybean. Crop Sci. 36:1079.

EXHIBIT B: STATEMENT OF DISTINCTNESS (AMENDED JUNE 2004)

'5002T' is most similar to 'Manokin' except that the **genomic DNA** of '5002T' exhibits a 257 base-pair length band, whereas 'Manokin' exhibits a 260 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt222 simple sequence repeat primer at the **Satt222 locus of molecular linkage group H**. (See attached Figure P.1).

'5002T' is most similar to 'Manokin' except that the **genomic DNA** of '5002T' exhibits a 172 base-pair length band, whereas 'Manokin' exhibits a 190 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt308 simple sequence repeat primer at the **Satt308 locus of molecular linkage group M**. (See attached Figure P.2).

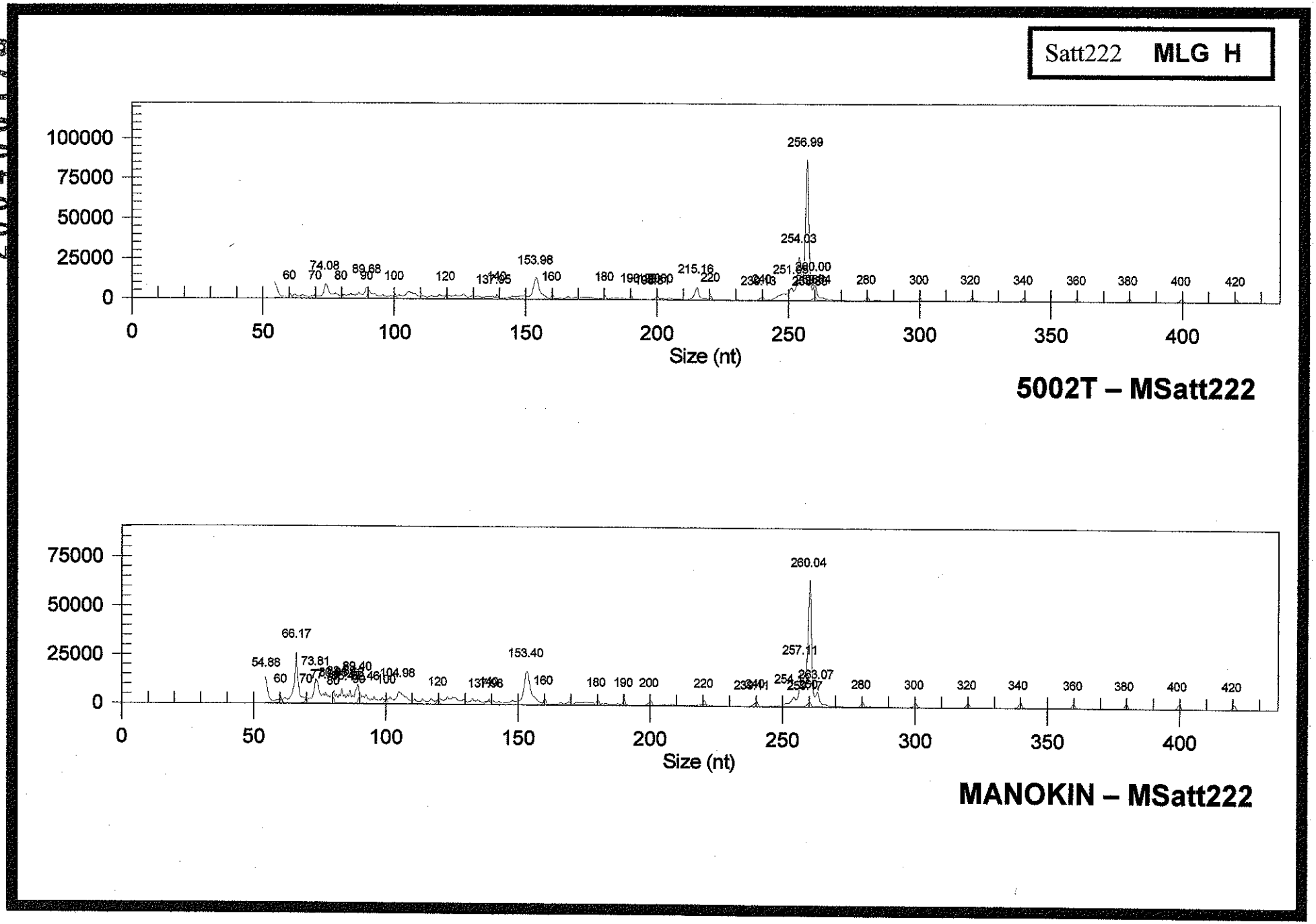
'5002T' is most similar to 'Manokin' except that the **genomic DNA** of '5002T' exhibits a 179 base-pair length band, whereas 'Manokin' exhibits a 199 base-pair length band, when amplified via PCR using an M-13 fluorescent type of Satt440 simple sequence repeat primer at the **Satt440 locus of molecular linkage group I**. (See attached Figure P.3).

'5002T' is most similar to 'Manokin' except that '5002T' is *susceptible* to Race 3 of **Soybean Cyst Nematode** (SCN) *Heterodera glycines* while 'Manokin' is *resistant*. (see Soybean Cyst Nematode Race 3 Table). Note that Soybean Cyst Nematode race 3 ratings were based on screenings made at Jackson, Tennessee. For the screening, seed of each strain was planted in sterile soil at the rate of one per pot for a total of 7 pots per strain. At the time of planting, 1000 eggs of the race being evaluated were added to each pot. Approximately 4 weeks after planting plants were rated based on the number of female cysts on the roots.
The ratings were as follows:
1 = 0-5 female cysts on the roots
2 = 6-10 female cysts on the roots
3 = 11-20 female cysts on the roots
4 = 21-40 female cysts on the roots
5 = >40 female cysts on the roots

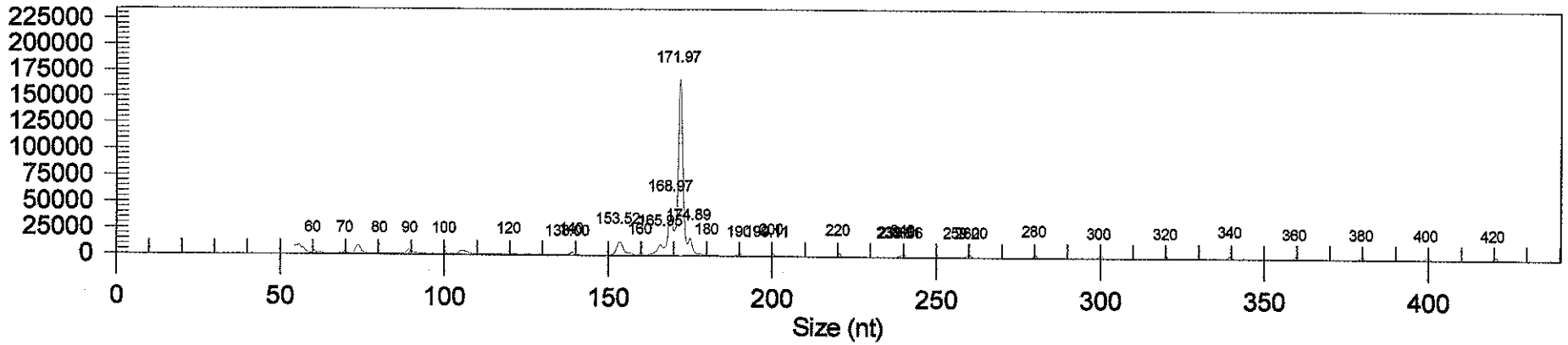
'5002T' is most similar to 'Manokin' except that '5002T' is *susceptible* to **Southern Root Knot Nematode** *Meloidogyne incognita* while 'Manokin' is *moderately resistant*. (see Root-Knot Nematode Table). Note that Root-knot Nematode, Meloidogyne incognita, ratings were based on screenings made at the University of Georgia. Seven to ten days after planting, plants were inoculated with 3000 root-knot nematode eggs. Approximately 30 days after planting plants were rated based on the total number of galls per root system.
The ratings were as follows:
1 = 0-8 galls on the roots
2 = 9-16 galls on the roots
3 = 17-24 galls on the roots
4 = 25-32 galls on the roots
5 = >33 galls on the roots

'5002T' is most similar to 'Manokin' except that '5002T' is *significantly shorter* in **plant height** than 'Manokin'. (See attached Plant Height Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that plant heights are reported in centimeters).

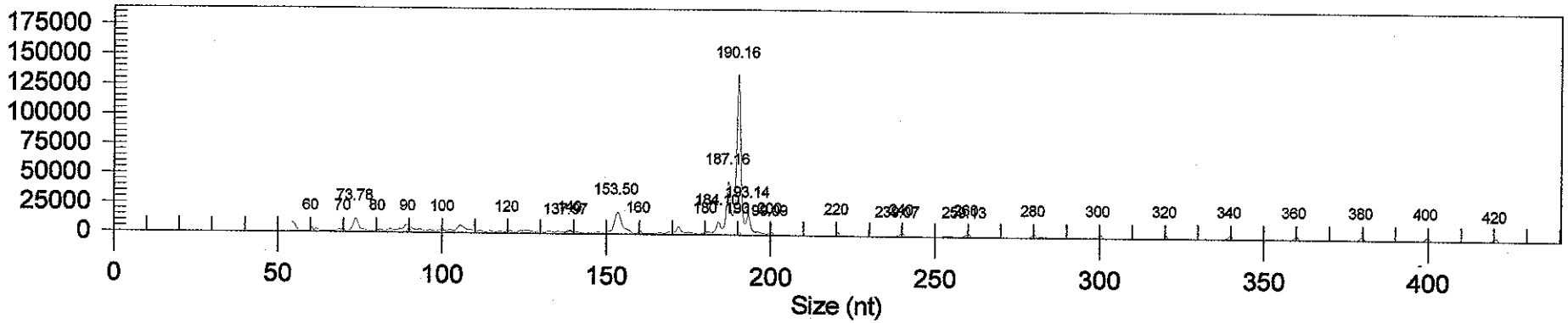
'5002T' is most similar to 'Manokin' except that '5002T' is *significantly larger* in **seed size** than 'Manokin'. (See attached Seed Size Tables 1998, 1999, 2000, 2001, 2002, and 1998-2002, note that seed sizes are reported in milligrams per seed).


Satt222 MLG H
100000
75000
50000
25000
0
256.99
254.03
153.98
74.08
89.68
215.16
251.88
260.00
0
50
100
150
200
250
300
350
400
Size (nt)
5002T – MSatt222
75000
50000
25000
0
260.04
66.17
54.88
73.81
153.40
257.11
263.07
104.98
Size (nt)
MANOKIN – MSatt222

Satt308 **MLG M**

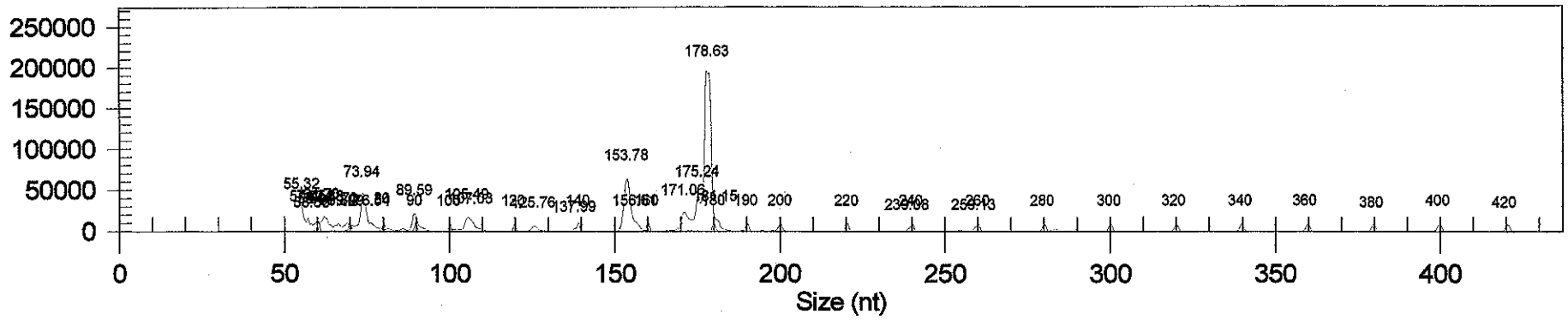


5002T – MSatt308

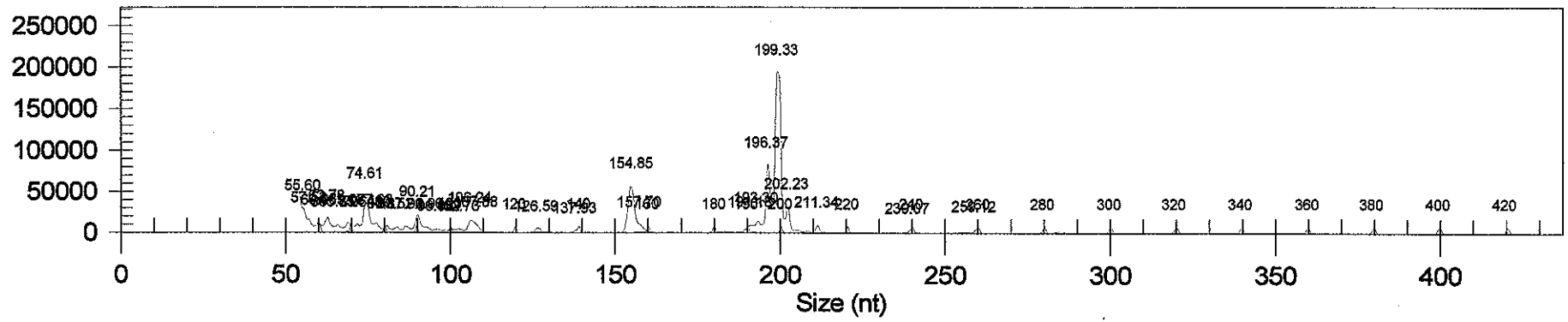


MANOKIN – MSatt308

Satt440 **MLG I**



5002T – MSatt440



MANOKIN – MSatt440

5002T is most similar in its characteristics to the variety Manokin. The following two charts show significant differences SCN race 3 and for Root-Knot nematod 5002T is susceptible to SCN race 3 while Manokin has resistance. 5002T is susceptible to Root-knot nematode while Manokin has resistance.

Soybean Cyst Nematode
Race 3

	SCN 3	
	5002T	MANOKIN
1998-PRELIMINARY GROUP VB	4.1	1.0
1999-UNIFORM GROUP V	5.0	1.3
2000-UNIFORM GROUP V	4.2	1.0
2001-UNIFORM GROUP V	4.8	1.0
2002-UNIFORM GROUP V	4.2	1.0
MEAN*	4.5	1.1
VARIANCE	5.780	
LSD	1.075	

SCN3 - Soybean Cyst Nematode race 3 ratings were based on screenings made at Jackson, Tennessee. For the screening, seed of each strain was planted in sterile soil at the rate of one per pot for a total of 7 pots per strain. At the time of planting, 1000 eggs of the race being evaluated were added to each pot. Approximately 4 weeks after planting plants were rated based on the number of female cysts on the roots.

The ratings were as follows:
1 = 0-5 female cysts on the roots
2 = 6-10 female cysts on the roots
3 = 11-20 female cysts on the roots
4 = 21-40 female cysts on the roots
5 = >40 female cysts on the roots

Root-knot nematode
Meloidogyne incognita

	Mi	
	5002T	MANOKIN
1998-PRELIMINARY GROUP VB	4.2	2.3
1999-UNIFORM GROUP V	5.0	1.3
2000-UNIFORM GROUP V	5.0	1.3
2001-UNIFORM GROUP V	4.0	2.5
2002-UNIFORM GROUP V	5.0	2.3
MEAN*	4.6	1.9
VARIANCE	3.645	
LSD	0.854	

Mi - Root-knot Nematode, *Meloidogyne incognita*, ratings were based on screenings made at the University of Georgia. Seven to ten days after planting, plants were inoculated with 3000 root-knot nematode eggs. Approximately 30 days after planting plants were rated based on the total number of galls per root system.

The ratings were as follows:
1 = 0-8 galls on the roots
2 = 9-16 galls on the roots
3 = 17-24 galls on the roots
4 = 25-32 galls on the roots
5 = >33 galls on the roots

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT C

OBJECTIVE DESCRIPTION OF VARIETY
Soybean (*Glycine max* (L.) Merr.)

NAME OF APPLICANT (S)	TEMPORARY OR EXPERIMENTAL DESIGNATION	VARIETY NAME
Tennessee Advanced Genetics, Inc.	TN96-68	5002T

ADDRESS *(Street and No. or RD No., City, State, Zip Code, and Country)*

2640-C Nolensville Road
Nashville, TN 37211

FOR OFFICIAL USE ONLY

PVPO NUMBER 200400178

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

Place the appropriate number that describes the varietal character of this variety in the spaces below.

Place a zero in the first box (e.g., [0][9][9] or [0][9]) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used _____. Please answer all questions for your variety; lack of response may delay progress of your application.

A. MORPHOLOGY:

Seed Shape:

[2] 1 = Spherical (L/W, L/T, and T/W ratios < 1.2)
2 = Spherical-Flattened (L/W ratio > 1.2; L/T ratio < 1.2)
3 = Elongate (L/W ratio > 1.2; T/W ratio < 1.2)
4 = Elongate-Flattened (L/T ratio > 1.2; L/W ratio > 1.2)

Seed Coat Color:

* [1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other (Specify) _____

Seed Coat Luster:

[1] 1 = Dull 2 = Shiny

Seed Size:

* [1][4] grams/100 seeds

Hilum Color:

* [5] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black
7 = Other (Specify) _____

A. MORPHOLOGY: (continued)

Cotyledon Color: (mature seed)
* [1] 1 = Yellow 2 = Green

Seed Protein Peroxidase Activity:
* [0] 1 = Low 2 = High

Hypocotyl Color:
* [1] 1 = Green ('Evans' or 'Davis') 2 = Green with Bronze Bands below Cotyledon ('Woodworth' or 'Tracy') 3 = Light Purple below Cotyledons ('Beeson' or 'Pickett 71') 4 = Dark Purple extending to unifoliolate leaves (Hodgson', 'Coker', or 'Hampton 266A')

Leaf Shape:
* [3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other (Specify) ________

Flower Color:
* [1] 1 = White 2 = Purple 3 = White with a Purple Throat

Pod Color:
* [1] 1 = Tan 2 = Brown 3 = Black

Pubescence Color:
* [2] 1 = Gray 2 = Brown (Tawny) 3 = Light Tawny

Plant Habit:
* [1] 1 = Determinate 2 = Semi-determinate 3 = Indeterminate 4 = Intermediate

Maturity Group:
* [8]

1 = 000	2 = 00	3 = 0	4 = I	5 = II
6 = III	7 = IV	8 = V	9 = VI	10 = VII
11 = VIII	12 = IX	13 = X	14 = XI	15 = XII

Maturity Subgroup:
* [0] Please enter a value from 0-9

B. DISEASE REACTIONS: 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Tolerant

NOTE: Failure to supply information for at least 5 of the following disease reactions will result in significant delay in issuance of the certificate. Items denoted by and asterisk are the disease reactions most useful in the examination process.

Bacterial
* [0] Bacterial Pustule (*Xanthomonas campestris* pv. *glycines* (Nakano) Dye)
* [0] Bacterial Blight (*Pseudomonas syringae* pv. *glycinea* (Coerper) Young, Dye, & Wilkie)
* [0] Wildfire Blight (*Pseudomonas syringae* pv. *tabaci* (Wolf & Foster) Young, Dye, & Wilkie)

Fungal
* [0] Brown Spot (*Septoria glycines* Hemmi)
* [2] Frogeye Leaf Spot (*Cercospora sojina* Hara)

[ ] race 1 [ ] race 2 [ ] race 3 [ ] race 4
[ ] race 5 [ ] race 6 [ ] race 7 [ ] Important: Any other races tested (Please Specify) Naturally occurring population

B. DISEASE REACTIONS: (continued)

[0] Target Spot (*Corynespora cassiicola* (Berk. & Curt.) Wei)
[0] Downy Mildew (*Peronspora trifoliorum* var. *manchurica* (Naum.) Syd. Ex Gäum)
[0] Powdery Mildew (*Microsphaera diffusa* Cke. & Pk.)
* [0] Brown Stem Rot (*Phialophora gregata* (Allington & Chamberlain) W. Gams.)
* [2] Stem Canker (*Diaporthe phaseolorum* (Cke. & Ell.) Sacc.var. caulivora Athow & Caldwell)
* [0] Pod and Stem Blight (*Diaporthe phaseolorum* (Cke. & Ell.) (Sacc. Var. *sojae* (Lehman) Wehm.)
[0] Purple Seed Stain (*Cercospora kikuchii* (T. Matsu. & Tomoyasu) Gardener)
[0] Rhizoctonia Root Rot (*Rhizoctonia solani* Kühn)

Presence of genes coding for reaction to Phytophthora Root Rot

[0] Rps1 (Williams)	[0] Rps1-a (Mukden)	[0] Rps1-b (Sanga)	[0] Rps1-c (Arksoy)	[0] Rps1-d (PI 103.091)	[0] Rps1-e (PI 172.907)
[0] Rps1-k (Kingwa)	[0] Rps2 (CNS)	[0] Rps3-a (PI 171.442)	[0] Rps3-b (PI 172.901)	[0] Rps3-c (PI 340.046)	
[0] Rps4 (PI 86.050)	[0] Rps5 (PI 91.160)	[0] Rps6 (Altona)	[0] Rps7 (Harosoy)	[0] Rps? (Nezumisaya, OX939, OX940)	

*Phytophthora Root Rot (Phytophthora sojae (Kaufmann & Gerdemann)

[0] race 1	[0] race 2	[0] race 3	[0] race 4	[0] race 5	[0] race 6
[0] race 7	[0] race 8	[0] race 9	[0] race 10	[0] race 11	[0] race 12
[0] race 13	[0] race 14	[0] race 15	[0] race 16	[0] race 17	[0] race 18
[0] race 19	[0] race 20	[0] race 21	[0] race 22	[0] race 23	[0] race 24
[0] race 25	[0] race 26	[0] race 27	[0] race 28	[0] race 29	[0] race 30
[0] race 31	[0] race 32	[0] race 33	[0] race 34	[0] race 35	[0] race 36
[0] race 37	[0] race 38	[0] race 39	[0] race 40	[0] race 41	[0] race 42
[0] race 43	[0] race 44	[0] race 45	[0] Important: Any other races tested (Please Specify)		

[0] Bud Blight (Tobacco Ringspot Virus)
[0] Yellow Mosaic (Bean Yellow Mosaic Virus)
* [0] Cowpea Mosaic (Cowpea Chlorotic Virus)
[0] Pod Mottle (Bean Pod Mottle Virus)
* [1] Seed Mottle (Soybean Mosaic Virus)

Nematode

*Soybean Cyst Nematode (*Heterodera glycines* Ichinohe)

[0] race 1	[0] race 4	[0] race 9
[1] race 2	[0] race 5	[1] race 14
[1] race 3	[0] race 6	[ ] Important: Any other races tested (Please Specify)

[0] Lance Nematode (*Hoplolaimus columbus* Sher)
[1] Southern Root Knot Nematode (*Meliodogyne incognita* (Kofoid & White) Chitwood)
[0] Northern Root Knot Nematode (*Meliodogyne hapla* Chitwood)

B. DISEASE REACTIONS: (continued)

[1] Peanut Root Knot Nematode (*Meliodogyne arenaria* (Neal) Chitwood)
[0] Reniform Nematode (*Rotylenchus reniformus* Linwood & Olivera)
[0] Javanese Nematode (*Meliodogyne javanica* (Treub) Chitwood)
[0] Important: Other Nematodes tested (Please Specify) _____

C. PHYSIOLOGICAL RESPONSES: 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Tolerant

[0] Iron Chlorosis on Calcareous Soil
[0] Phosphorus
[0] Boron
[0] Aluminum
[0] Salt
[0] Drought

[ ] Important: Other (Please Specify) _____

D. INSECT REACTIONS: 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Tolerant

[0] Mexican Bean Beetle (*Epilachna varivestis* Mulsant)
[0] Potato Leaf Hopper (*Empoasca fabae* (Harris))
[0] Important: Other (Please Specify) _____

E. HERBICIDE REACTIONS: 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Tolerant

[0] Metribuzin
[0] Bentazone
[0] Sulfonylurea
* [0] Glyphosate
[0] Glufosinate
[0] Pendimethalin
[0] Important: Other (Please Specify) _____

F. TRANSGENIC COMPOSITION:

Has the development of the subject variety included the insertion of genetic material from an organism other than a soybean, or, the removal of genetic material from the application variety?

If yes, please complete the following information requests*. Use additional pages if necessary. ☐ Yes ☒ No

1. Please state the vector's name:

2. Please state the vector components:

3. Please describe the genetic material successfully transferred into the subject variety:

4. Please describe the insertion protocol:

* A literature citation(s) explaining the four information requests above may be an acceptable alternative to completion of the "Transgenic Composition" portion of this form.

EXHIBIT D: ADDITIONAL SUPPORTING INFORMATION

5002T is a Registered Cultivar CV-466.

The number PI 634193 has been assigned to 5002T by The National Plant Germplasm System. Descriptive information is available at http://www.ars-grin.gov/cgi-bin/npgs/html/acchtml.pl?1650011

The 5002T registration is scheduled to appear in Crop Science July-August 2004 (vol. 44, no.4); 'Registration of 5002T Soybean' V.R. Pantalone*, F.L. Allen, and D. Landau-Ellis, where additional descriptive information is available.

Seed of 5002T is stored with the National center for Genetic Resources Preservation and has been assigned the number NSSL 427652.01.

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Plant Height Table 1998. Mean **plant height, per location**, in the **1998** USDA-ARS Southern Uniform Test.

	Plant Height (cm)	
1998 Location	**'5002T'**	**'Manokin'**
BIXBY,OK98	73.7	63.5
JACKSON,TN98	78.7	86.4
KEISER,AR98	63.5	66.0
PITTSBURG,KS98	87.6	88.9
PLYMOUTH,NC98	66.0	82.6
PORTAGEVILLE,MO(A)98	50.8	66.0
QUEENSTOWN,MD98	72.4	86.4
STONEVILLE,MS98	55.9	55.9
ULLIN,IL98	49.5	73.7
WARSAW,VA98	54.6	55.9
1998 Mean	**65.3**	**72.5**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 5.1, P-valuc =0.05 R^2 = 97.5%, CV = 6.6%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 1999. Mean **plant height, per location,** in the 1999 USDA-ARS Southern Uniform Test.

	Plant Height (cm)	
1999 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL99	69.4	73.7
BIXBY,OK99	58.4	66.0
BOSSIER CITY,LA99	64.3	80.4
GEORGETOWN,DE99	94.0	101.6
KNOXVILLE,TN99	62.6	76.2
MCCUNE,KS99	47.4	53.3
PINE TREE,AR99	54.6	61.0
PLYMOUTH,NC99	89.7	74.5
PORTAGEVILLE,MO(A)99	71.1	86.4
PORTAGEVILLE,MO(B)99	50.8	63.5
PRINCETON,KY99	97.4	101.6
PROSPER,TX99	38.1	43.2
QUEENSTOWN,MD99	72.0	79.6
SPRINGFIELD,TN99	61.8	72.0
STONEVILLE,MS99	71.1	61.0
STUTTGART,AR99	88.9	83.8
SUFFOLK,VA99	76.2	82.1
ULLIN,IL99	77.9	94.8
WARSAW,VA99	45.7	55.9
1999 Mean	**68.0**	**74.2**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin'		
F-value = 7.8, P-value =0.01		
R^2 = 95.0, CV = 9.5%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 2000. Mean **plant height, per location,** in the **2000** USDA-ARS Southern Uniform Test.

	Plant Height (cm)	
2000 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL00	72.0	73.7
BOSSIER CITY,LA00	55.9	68.6
CALHOUN,GA00	55.0	72.0
GEORGETOWN,DE00	94.0	94.0
KNOXVILLE,TN00	74.5	77.0
MCCUNE,KS00	68.6	81.3
ORANGE,VA00	79.6	92.3
PITTSBURG,KS00	83.8	94.0
PLYMOUTH,NC00	78.7	82.1
PORTAGEVILLE,MO(A)00	66.0	77.9
PORTAGEVILLE,MO(B)00	45.7	50.0
PRINCETON,KY00	97.4	98.2
QUEENSTOWN,MD00	78.7	88.0
SPRINGFIELD,TN00	60.1	74.5
STARKVILLE,MS00	63.5	76.2
STONEVILLE,MS00	40.6	61.0
STUTTGART,AR00	48.3	63.5
SUFFOLK,VA00	50.0	49.1
ULLIN,IL00	83.8	93.1
WARSAW,VA00	75.4	86.4
2000 Mean	**68.6**	**77.6**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin'		
F-value = 32.8, P-value = 0.0001		
R^2 = 95.4%, CV = 9.1%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 2001. Mean **plant height, per location,** in the **2001** USDA-ARS Southern Uniform Test.

	Plant Height (cm)	
2001 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL01	66.0	54.2
BOSSIER CITY,LA01	64.3	53.3
GEORGETOWN,DE01	88.9	72.8
KEISER,AR01	81.3	61.0
KNOXVILLE,TN01	68.6	67.7
MCCUNE,KS01	68.6	60.1
ORANGE,VA01	114.3	105.8
PINE TREE,AR01	99.9	78.7
PITTSBURG,KS01	65.2	73.7
PLYMOUTH,NC01	71.1	58.4
PORTAGEVILLE,MO(A)01	69.4	70.3
PORTAGEVILLE,MO(B)01	86.4	80.4
PRINCETON,KY01	88.0	88.0
PROSPER,TX01	45.7	40.6
QUEENSTOWN,MD01	70.2	69.4
SPRINGFIELD,TN01	107.5	98.2
STARKVILLE,MS01	58.4	58.4
STONEVILLE,MS01	66.0	66.0
STUTTGART,AR01	36.8	35.6
SUFFOLK,VA01	55.9	70.3
ULLIN,IL01	58.4	48.3
WARSAW,VA01	67.7	73.7
2001 Mean	**72.7**	**67.5**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 4.9, P-value = 0.0383 R^2 = 97.0%, CV = 8.0%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 2002. Mean **plant height, per location**, in the **2002** USDA-ARS Southern Uniform Test.

	Plant Height (cm)	
2002 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL02	46.6	61.0
BIXBY,OK02	58.4	73.7
BOSSIER CITY,LA02	58.4	54.2
GEORGETOWN,DE02	87.2	94.8
KEISER,AR02	78.7	89.7
KNOXVILLE,TN02	72.8	85.5
MARIANNA,AR02	69.4	76.2
MCCUNE,KS02	77.9	88.9
ORANGE,VA02	55.0	71.1
PITTSBURG,KS02	51.6	55.9
PORTAGEVILLE,MO(A)02	66.0	78.7
PORTAGEVILLE,MO(B)02	55.9	66.0
PRINCETON,KY02	84.7	98.2
PROSPER,TX02	37.2	44.9
QUEENSTOWN,MD02	77.9	82.1
STONEVILLE,MS02	50.8	66.0
SUFFOLK,VA02	63.5	77.9
ULLIN,IL02	71.1	83.8
WARSAW,VA02	66.9	70.3
2002 Mean	**64.7**	**74.7**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 52.4, P-value = 0.0001 R^2 = 94.7%, CV = 9.3%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Plant Height Table 1998-2002. **Five-year** mean **plant height** in the USDA-ARS Southern Uniform Tests

	Plant Height (cm)	
Year	**'5002T'**	**'Manokin'**
1998	65.3	72.5
1999	68.0	74.2
2000	68.6	77.6
2001	72.7	67.5
2002	64.7	74.7
Mean 1998-2002	**67.8**	**73.3**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 20.0, P-value =0.0001 R^2 = 95.5%, CV = 9.14%		

Uniform test plots typically consist of four-row plots, 20 feet in length, Replicated 3-times per environment.

Mean plant heights for 1998, 1999, 2000, 2001, 2002 USDA-ARS Southern Uniform Test: (BT: 6/30/2004 per applicant's authorization)

1998

'5002T'	'Manokin'
73.7	63.5
78.7	86.4
63.5	66
87.6	88.9
66	82.6
50.8	66
72.4	86.4
55.9	55.9
49.5	73.7
54.6	55.9
65.3	72.5

1999

'5002T'	'Manokin'
69.4	73.7
58.4	66
64.3	80.4
94	101.6
62.6	76.2
47.4	53.3
54.6	61
89.7	74.5
71.1	86.4
50.8	63.5
97.4	101.6
38.1	43.2
72	79.6
61.8	72
71.1	61
88.9	83.8
76.2	82.1
77.9	94.8
45.7	55.9
68.0	74.2

2000

'5002T'	'Manokin'
72	73.7
55.9	68.6
55	72
94	94
74.5	77
68.6	81.3
79.6	92.3
83.8	94
78.7	82.1
66	77.9
45.7	50
97.4	98.2
78.7	88
60.1	74.5
63.5	76.2
40.6	61
48.3	63.5
50	49.1
83.8	93.1
75.4	86.4
68.6	77.6

2001

'5002T'	'Manokin'
66	54.2
64.3	53.3
88.9	72.8
81.3	61
68.6	67.7
68.6	60.1
114.3	105.8
99.9	78.7
65.2	73.7
71.1	58.4
69.4	70.3
86.4	80.4
88	88
45.7	40.6
70.2	69.4
107.5	98.2
58.4	58.4
66	66
36.8	35.6
55.9	70.3
58.4	48.3
67.7	73.7
72.7	67.5

2002

'5002T'	'Manokin'
46.6	61
58.4	73.7
58.4	54.2
87.2	94.8
78.7	89.7
72.8	85.5
69.4	76.2
77.9	88.9
55	71.1
51.6	55.9
66	78.7
55.9	66
84.7	98.2
37.2	44.9
77.9	82.1
50.8	66
63.5	77.9
71.1	83.8
66.9	70.3
64.7	74.7

'5002T'	'Manokin'
65.3	72.5
68.0	74.2
68.6	77.6
72.7	67.5
64.7	74.7
67.8	73.3

Seed Size Table 1998. Mean **Seed Size, per location,** in the **1998** USDA-ARS Southern Uniform Test.

	Seed Size (mg/seed)	
1998 Location	**'5002T'**	**'Manokin'**
BIXBY,OK98	139.0	132.0
JACKSON,TN98	152.5	125.0
PITTSBURG,KS98	118.0	115.0
PLYMOUTH,NC98	159.0	141.0
PORTAGEVILLE,MO(A)98	115.0	99.0
QUEENSTOWN,MD98	137.0	141.0
STONEVILLE,MS98	122.0	99.0
ULLIN,IL98	107.5	87.5
WARSAW98	124.5	120.5
1998 Mean	**130.5**	**117.8**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 9.8, P-value =0.0139 R^2 = 98.2%, CV = 5.2%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Size Table 1999. Mean **Seed Size, per location,** in the **1999** USDA-ARS Southern Uniform Test.

	Seed Size (mg/seed)	
1999 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL99	97.0	98.0
BIXBY,OK99	199.0	149.0
KNOXVILLE,TN99	121.0	103.0
MCCUNE,KS99	125.0	125.0
PINE TREE,AR99	156.0	137.7
PLYMOUTH,NC99	131.0	122.0
PORTAGEVILLE,MO(A)99	128.0	119.0
PORTAGEVILLE,MO(B)99	128.0	134.0
PRINCETON,KY99	125.0	125.0
PROSPER,TX99	115.0	106.0
QUEENSTOWN,MD99	133.0	115.7
SPRINGFIELD,TN99	110.0	110.0
STONEVILLE,MS99	167.0	132.0
SUFFOLK,VA99	116.7	99.0
ULLIN,IL99	113.3	107.3
WARSAW,VA99	153.0	132.0
1999 Mean	**132.4**	**119.7**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin'		
F-value = 13.6, P-value = 0.0022		
R^2 = 99.6%, CV = 2.7%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Size Table 2000. Mean **Seed Size, per location,** in the **2000** USDA-ARS Southern Uniform Test.

	Seed Size (mg/seed)	
2000 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL00	107.0	106.0
CALHOUN,GA00	150.0	140.0
KNOXVILLE,TN00	136.0	126.0
MCCUNE,KS00	99.0	104.0
ORANGE,VA00	168.0	150.3
PITTSBURG,KS00	107.0	105.0
PLYMOUTH,NC00	141.0	126.0
PORTAGEVILLE,MO(A)00	130.0	109.0
PORTAGEVILLE,MO(B)00	132.0	117.0
PRINCETON,KY00	175.0	140.0
QUEENSTOWN,MD00	159.3	141.0
SPRINGFIELD,TN00	147.0	121.0
STONEVILLE,MS00	138.0	117.0
SUFFOLK,VA00	145.7	134.0
ULLIN,IL00	150.7	117.3
WARSAW,VA00	154.6	130.7
2000 Mean	**140.0**	**124.0**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 30.7, P-value = 0.0001 R^2 = 98.8%, CV = 3.5%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Size Table 2001. Mean **Seed Size, per location,** in the **2001** USDA-ARS Southern Uniform Test.

	Seed Size (mg/seed)	
2001 Location	**'5002T'**	**'Manokin'**
BELLE MINA,AL01	169.6	142.3
KNOXVILLE,TN01	137.0	123.0
MCCUNE,KS01	137.0	137.0
ORANGE,VA01	126.7	117.7
PINE TREE,AR01	145.0	142.0
PITTSBURG,KS01	129.0	144.0
PLYMOUTH,NC01	162.0	134.0
PORTAGEVILLE,MO(A)01	147.0	132.0
PORTAGEVILLE,MO(B)01	155.0	138.0
PRINCETON,KY01	146.0	123.0
QUEENSTOWN,MD01	137.7	115.0
STONEVILLE,MS01	137.0	110.0
SUFFOLK,VA01	129.0	113.3
ULLIN,IL01	149.3	124.7
WARSAW,VA01	153.3	134.7
2001 Mean	**144.0**	**128.7**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 20.2, P-value = 0.0006 R^2 = 90.2%, CV = 7.6%		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Size Table 2002. Mean **Seed Size, per location,** in the **2002** USDA-ARS Southern Uniform Test.

	Seed Size (mg/seed)	
2002 Location	**'5002T'**	**'Manokin'**
BIXBY,OK02	141.0	134.0
KNOXVILLE,TN02	138.0	120.0
MCCUNE,KS02	122.0	130.0
ORANGE,VA02	179.7	180.0
PITTSBURG,KS02	105.0	114.0
PLYMOUTH,NC02	155.0	154.0
PORTAGEVILLE,MO(A)02	146.0	112.0
PORTAGEVILLE,MO(B)02	124.0	107.0
PRINCETON,KY02	126.40	113.9
PROSPER,TX02	96.0	114.0
SUFFOLK,VA02	177.3	160.3
ULLIN,IL02	164.0	132.3
WARSAW,VA02	152.0	158.0
2002 Mean	**140.5**	**133.0**
Statistical analysis via ANOVA, No significant difference in 2002		

Uniform test plots typically consist of four-row plots, 20 feet in length, replicated 3-times per location.

Seed Size Table 1998-2002. **Five-year mean Seed Size** in the USDA-ARS Southern Uniform Tests

	Seed Size (mg/seed)	
Year	**'5002T'**	**'Manokin'**
1998	130.5	117.8
1999	132.4	119.7
2000	140.0	124.0
2001	144.0	128.7
2002	140.5	133.0
Mean 1998-2002	**137.5**	**124.6**
Statistical analysis via ANOVA, '5002T' *differs significantly* from 'Manokin' F-value = 67.27, P-value =0.0001 R^2 = 95.8%, CV = 7.57%		

Uniform test plots typically consist of four-row plots, 20 feet in length, Replicated 3-times per environment.

1998

'5002T'	'Manokin'
139	132
152.5	125
118	115
159	141
115	99
137	141
122	99
107.5	87.5
124.5	120.5
130.5	117.8

1999

'5002T'	'Manokin'
97	98
199	149
121	103
125	125
156	137.7
131	122
128	119
128	134
125	125
115	106
133	115.7
110	110
167	132
116.7	99
113.3	107.3
153	132
132.4	119.7

2000

'5002T'	'Manokin'
107	106
150	140
136	126
99	104
168	150.3
107	105
141	126
130	109
132	117
175	140
159.3	141
147	121
138	117
145.7	134
150.7	117.3
154.6	130.7
140.0	124.0

2001

'5002T'	'Manokin'
169.6	142.3
137	123
137	137
126.7	117.7
145	142
129	144
162	134
147	132
155	138
146	123
137.7	115
137	110
129	113.3
149.3	124.7
153.3	134.7
144.0	128.7

2002

'5002T'	'Manokin'
141	134
138	120
122	130
179.7	180
105	114
155	154
146	112
124	107
126.4	113.9
96	114
177.3	160.3
164	132.3
152	158
140.5	133.0

'5002T'	'Manokin'
130.5	117.8
132.4	119.7
140.0	124.0
144.0	128.7
140.5	133.0
137.5	124.6

'5002T' seed size (mg/seed) 5-yr. means. (RT: 6/20/2004).

Table 1. Agronomic and disease resistance characteristics of 5002T compared to most similar commercial variety 'Manokin' (1998-2001, 4-yr avg†).

LINE	MAT	HT	LOD	SS	PRO	OIL	SC	SMV	SCN 2	SCN 3	SCN 14	M i	M a	SDS	FELS
5002T	10/4	27	1.9	13.8	41.4	20.0	R	S	5.0	4.6	4.6	4.6	2.4	0.5	0.0
Manokin	10/3	29	2.2	12.3	41.5	19.5	R	S	4.3	1.1	4.5	1.8	2.1	3.7	1.7

† 1998 Southern Regional Uniform Preliminary Test, 1999, 2000, 2001 USDA Southern Regional Uniform Test

(2001 data for protein and oil concentration not yet available)

MAT = Date of maturity

HT = Plant height at maturity (inches)

LOD = Lodging score (1-5 scale, 1 = erect, 5 = prostrate)

SS = Seed size (g/100 seeds)

PRO = Seed protein concentration at zero moisture

OIL = Seed oil concentration at zero moisture

SC = Stem canker (R = resistant)

SMV = Soybean mosaic virus (R = resistant, M= moderately resistant)

SCN 2 = Soybean cyst nematode, Race 2 (1-5 scale, 1 = resistant, 5 = susceptible)

SCN 3 = Soybean cyst nematode, Race 3 (1-5 scale, 1 = resistant, 5 = susceptible)

SCN 14 = Soybean cyst nematode, Race 14 (1-5 scale, 1 = resistant, 5 = susceptible)

M a = Root knot nematode, *Meloidogyne arenaria* (1-5 scale, 1 = resistant, 5 = susceptible)

M i = Root knot nematode *Meloidogyne incognita* (1-5 scale, 1 = resistant, 5 = susceptible)

SDS = Sudden Death Syndrome, [disease index (DX) scale, where DX = DI*DS/9, and DI = disease incidence as % of plants exhibiting symptoms, and DS = disease severity, scored on a 1-9 scale with 1 = mild chlorosis to 9 = premature death of plant

FELS = Frogeye leaf spot (0-10 scale, 0 = no disease, 10 = most severe disease)

Table 2. Yield (Bu/A) of 5002T in comparison with the early USDA MG V checks, Manokin, and the late USDA MG V check, Hutcheson, as well as the new UT variety, 5601T, over four years in USDA Southern Regional Uniform Tests (1998 - 2001).

YEAR	TEST	N LOCS	**5002T**	Manokin	HUTCHESON	5601T
1998	Preliminary V	9	42.0	40.7	38.7	43.3
1999	Uniform V	24	42.2	40.4	43.0	43.9
2000	Uniform V	22	48.6	45.8	44.5	50.1
2001	Uniform V	20	53.0	42.3	48.4	51.1
LSD (0.05) = 1.0		**MEAN**	**46.9**	**42.5**	**44.4**	**47.6**

N LOCS = Number of field testing locations

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued *(7 U.S.C. 2421)*. The information is held confidential until the certificate is issued *(7 U.S.C. 2426)*.

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Tennessee Advanced Genetics, Inc.	TN96-68	5002T
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(Include area code)*	**6. FAX** *(Include area code)*
2640-C Nolensville Road Nashville, TN 37211	(615) 242-0467	(615) 248-3461
	7. PVPO NUMBER 200400178	

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☑ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? **If no, give name of country.** ☑ YES ☐ NO

10. Is the applicant the original owner? ☐ YES ☑ NO **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☐ YES ☐ NO **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☐ YES ☐ NO **If no, give name of country**

11. Additional explanation on ownership *(Trace ownership from original breeder to current owner. Use the reverse for extra space if needed)*:

Acquired from The University of Tennessee, Knoxville, TN

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.